4.7. PETROLEUM CONTROL

Management Measure for Petroleum Control:

Reduce the amount of fuel and oil from boat bilges and fuel tank air vents entering marina and surface waters.

Management Measure Description

Fuel is easily spilled into surface waters from the fuel tank air vent while fueling a boat, and oil is easily discharged during bilge pumping. A small fuel sheen on the water surface near docked boats is not an uncommon sight and can be caused by a spill of only a few drops or a slow leak from a gas tank. Because of the properties of oil, a cup of oil can spread as a very thin oil sheen over more than an acre of calm water. Small amounts of oil spilled from numerous boats can accumulate to create large oil sheens. Gasoline spills are also a safety problem because of gasoline's flammability.

Hydrocarbons are dangerous to aquatic plants and animals both at and below the water surface. Less than half of spilled oil stays in the water (the rest evaporates). Spread over the surface, oil creates a barrier to oxygen movement across the water surface and to animals (for instance, insect larvae) that must breathe at the surface. At and below the surface, oil attaches to plant leaves, decreasing their respiration, and bottom sediments. It can also be ingested by animals directly, or indirectly by feeding on other organisms such as filter feeders (mussels, sponges) that have ingested the oil. The hydrocarbons in oil harm juvenile fish, upset fish reproduction, and interfere with the growth and reproduction of bottom-dwelling organisms. Some oil remains as sediment contamination.

Petroleum spills can also cause structural damage at marinas, such as discoloration on boat hulls, woodwork, and paint, and deterioration of white styrofoam in floats and docks, since petroleum dissolves this material.

The practices discussed here are used in many marinas, and their use can minimize the entry of petroleum from fueling and bilge pumping into surface waters. Technologies such as air/fuel separators, oil-absorbing pads, and bioremedial pads and socks have been developed in response to a growing recognition of the ecological and cumulative damage that can be done by even small spills of petroleum products into surface waters. These small spills escape the attention of many people, and marina owners and operators can play an important role in bringing the importance of controlling this form of pollution to the attention of their patrons.

Some issues relevant to the Petroleum Control management measure are discussed below.

Engine Comparison

The wastes produced by 2- and 4-stroke engines are similar in quality, but not in quantity. Two-stroke engines cause no visible environmental damage, but they are a significant source of toxic pollution discharged into U.S. waterways. Approximately 25 percent of fuel and lubricating oil used by a 2-stroke engine is discharged unburned directly into the air and water. In comparison, 4-stroke engines consume fuel more efficiently and pollute much less. Newly designed 4-stroke outboard engines have reduced smoke,

fumes, and noise output, and their fuel economy is better than that of 2-stroke outboards.

New 2-stroke outboards incorporate technology such as direct fuel injection to improve performance and decrease polluting emissions. These new engines are approximately 75 percent cleaner than older 2-stroke engines. However, 4-stroke engines are 10 times cleaner than direct fuel-injection engines and 40 times cleaner than conventional 2-stroke engines. Because of their design, 4-stroke engines do not burn any oil and, therefore, release only approximately 20 percent of the exhaust emissions that 2-stroke engines emit. Four-stroke outboard engines that meet the EPA emissions criteria will take effect in the year 2006 are currently available to the public.

EPA has issued an Advance Notice of Proposed Rulemaking for emissions from new diesel marine engines at or above 50 horsepower. According to the rule, the pollution emitted by these engines must be reduced by 50 percent by the year 2020 and by 75 percent by the year 2025. Flexibility is built into compliance in that manufacturers will be able to comply with the new regulations by meeting an average pollution emission level for a class of products rather than meeting the specific criteria for each applicable product. The manufacturers are also free to choose how they will meet the new regulation levels. They can convert 2-stroke engines to 4-stroke engines or typical 2-stroke engines to direct-injection 2-stroke engines, add catalytic converters, or invent new designs. Further information on emissions and EPA rules regarding them can be found at <http://www.epa.gov/OMSWWW/01-nvfel.htm>.

Personal Watercraft (PWC)

Personal watercraft, such as jet skis, are considered to be Class A motorboats and are bound by many of the same regulations as other motorboats. They are propelled by waterjet drives, have shallow draft designs, and are able to quickly reach speeds over 65 mph. In recent years, approximately one-third of all boat sales have been PWCs.

PWCs, however, are causing concerns. The 2-stroke engines in most PWCs discharge up to one-third of their oil/gasoline fuel mixture unburned into the water in the same way that 2-stroke outboard engines do (although new generation PWCs are equipped with more efficient 4-stroke engines or vastly improved 2-stroke engines). The Personal Watercraft Industry Association is aware of the potential environmental problems associated with use of PWCs and recommends that users follow simple guidelines to reduce the impacts of PWC use. Many of the recommended guidelines are similar to EPA-recommended management practices:

- Refuel on land to reduce the chance of fuel spills into the water.
- Do not overfill fuel tanks.
- Perform all engine maintenance away from surface water.

Best Management Practices

Pollution Prevention Practices

- *Promote the installation and use of fuel/air separators on air vents or tank stems of inboard fuel tanks to reduce the amount of fuel spilled into surface waters during fueling.*

Often during fueling operations fuel overflows from the air vent from the built-in fuel tank on a boat. Attachments for vent lines on fuel tanks, which act as fuel/air separators, are available commercially and are easily installed on most boats. These devices release air and vapor but contain fuel before it can overflow. Marinas can make these units available in their retail stores and post notices describing their spill prevention benefits and availability.

- *Avoid overfilling fuel tanks.*

Fuel expands as it warms, and the temperature in a boat fuel tank usually is much higher than that in the storage tank—especially if stored in underground tanks. While fueling, a distinctive change in sound occurs when a tank is almost full,

and filling can be stopped at this time. This leaves a small amount of space in the tank to allow for expansion of the fuel with temperature changes. Without this space, fuel in a completely filled tank can spill out when the fuel expands. Automatic shutoff nozzles might not stop fuel flow prior to some fuel spillage through the air vent, and listening for the sound of the almost-full tank is the best way to know when to stop filling. Having an oil absorbent pad ready to wipe up any drops is also a good fueling practice.

- *Provide doughnuts or small petroleum absorption pads to patrons to use while fueling to catch splashback and the last drops when the nozzle is transferred back from the boat to the fuel dock.*

Although few of us might be concerned about drops of fuel spilled onto the ground while we fill our car at the gas station, at the marina those drops can go directly into surface waters. There is no oil/water separator or catch basin to prevent drops at the marina fuel dock from entering the water, so taking a little extra caution, and precautions to prevent spills, is good practice at the fueling dock. A doughnut placed over the fuel nozzle or a small absorbent pad in hand to catch any backsplash when the fuel tank is full and any drops that fall while the handle is replaced to the pump is an excellent and easy way to prevent the small spills that can add up to big problems.

A small absorbent pad temporarily attached to the hull below the fuel tank air vent during fueling provides an added precaution against fuel spilling directly into surface waters. Pads that attach on vertical or horizontal surfaces with suction cups are commercially available.

At Battery Park Marina on Lake Erie, staff cut absorption pads into squares, then cut an X-shaped hole in the center for the fuel nozzle to pass through. Any splashes while fueling are absorbed by the pad (EPA, 1996: *Clean Marinas—Clear Value*).

- *Keep engines properly maintained for efficient fuel consumption, clean exhaust, and fuel economy. Follow the manufacturer's specifications.*

Well-tuned and maintained engines burn fuel more efficiently, improve mileage, and lower exhaust emissions. Mixing fuel for 2-cycle outboard engines according to the manufacturer's specifications (usually 50:1 fuel to oil) can help prevent inefficient burning.

- *Routinely check for engine fuel leaks and use a drip pan under engines.*

The best way to keep fuel and oil out of bilge water is to check for and fix small leaks, including making sure fuel lines are secure and inspecting them for wear.

- *Avoid pumping any bilge water that is oily or has a sheen. Promote the use of materials that either capture or digest oil in bilges. Examine these materials frequently and replace as necessary.*

Marina operators can advertise the availability of oil-absorbing materials or can include the cost of installation of such material in yearly dock fees. A clause can be inserted in leasing agreements that requires boaters to use oil-absorbing materials in their bilges. Bioremediation pads and biosocks with natural oil-eating bacteria are available.

- *Extract used oil from absorption pads if possible, or dispose of it in accordance with petroleum disposal guidelines.*

If a container for recycling oil is available, place extracted oil into it. Recycled oil should be handled by a commercial waste oil hauler. If recycling is not an option, boat owners can place used pads in a sealed plastic bag and dispose of them with other oily wastes. All fuel- or oil-soaked materials should be stored together and removed by a certified waste hauler. Nonabsorbing booms can be cleaned and reused.

Some materials can be either recycled or burned as a heat source. If a marina doesn't have a used oil collection receptacle or program, a local department of environmental protection can be contacted for the location of the nearest used oil recycling station or collection point.

Source Reduction Practices

- *Prohibit the use of detergents and emulsifiers on fuel spills.*

Soaps, detergents, and emulsifying products will hide a spill and seemingly make it disappear, but they actually cause petroleum products to sink into the water where the combination of fuel and detergent can harm aquatic life and make the pollutants difficult to collect. Use of detergent bilge cleaners is illegal and subject to a high fine from the U.S. Coast Guard. Many bilge cleaners are actually detergents and their use should be discouraged as well, since environmentally friendly alternatives exist.

BMP Summary Table 7 summarizes the BMPs for Petroleum Control mentioned in this guidance

BMP Summary Table 7. PETROLEUM CONTROL MANAGEMENT MEASURE

MANAGEMENT MEASURE - Reduce the amount of fuel and oil from boat bilges and fuel tank air vents entering marina and surface waters.

ENVIRONMENTAL CONCERNS:

While more than half of the oil that spills into the water evaporates, less than a cup of oil can create a very thin sheen over more than an acre of calm water. Small amounts of oil spilled from numerous boats can accumulate to create large oil shine, which block oxygen from moving through the surface of the water and be harmful to animals and larvae that must break the surface to breathe. The hydrocarbons in oil harm juvenile fish, upset fish reproduction, and interfere with growth and reproduction of bottom dwelling organisms. Oil and gas that is ingested by one animal can be passed to the next animal that eats it. In a marina, petroleum spills will also dissolve the white Styrofoam in floats and docks, and discolor boat hulls, woodwork and paint. Gasoline spills, which evaporate quickly, are also a safety problem because of the flammability of this fumes.

Best Management Practice Examples & Type	Marina Location & Usage	Benefits to Marina	Projected Environmental Benefits	Initial Cost Estimate	Annual Operation & Maintenance Cost Estimate	Notes
POLLUTION PREVENTION PRACTICES						
Promote the installation and use of fuel/air separators on air vents or tank stems of inboard fuel tanks to reduce the amount of fuel spilled into surface waters during fueling	Boat - generally recommended	MODERATE benefit to boater; saves fuel and keeps hull cleaner	MODERATE; eliminates small but common mini spills from air vents	LOW	LOW	Products can be purchased from manufacturer or marina store
Avoid overfilling fuel tanks	Fuel dock - universally recommended	HIGH; marina policy for staff and fuel dock customers will reduce small spills, saving clean up costs and visible oil slicks	HIGH; as a practice this will reduce small spills from air vent when boats return to slips as fuel warms up and expands	None	None to LOW	Fuel expands as it warms, and the temperature in a boat fuel tank might be higher than that in fuel storage tank, especially if from underground; very effective when coupled with installation of fuel/air separator in fuel vent line.
Provide small petroleum absorption pads to patrons to use while fueling to catch splashback and the last drops when the nozzle is transferred back from the boat to the fuel dock	Fuel dock - universally recommended	HIGH; absorption pads are inexpensive and easily cut into smaller sizes for use by boaters; low technology and easy to use	HIGH; significantly reduces amount of small fuel spills in marina and visible petroleum sheens	LOW	LOW	If fuel absorbed is gasoline, do not store pad in an enclosed space until fumes have dispersed.

BMP Summary Table 7. (cont.) PETROLEUM CONTROL MANAGEMENT MEASURE						
Best Management Practice Examples & Type	**Marina Location & Usage**	**Benefits to Marina**	**Projected Environmental Benefits**	**Initial Cost Estimate**	**Annual Operation & Maintenance Cost Estimate**	**Notes**
Keep engines properly maintained for efficient fuel consumption, clean exhaust, and fuel economy. Follow the manufacturer's specifications	Marina area	LOW for marina; HIGH for boater; well tuned and maintained engines burn fuel more efficiently; fewer exhaust fumes	HIGH; well-tuned and maintained engines produce fewer emissions and leak less to the water	LOW	LOW	Well-maintained engines rarely leak fuel or oil.
Routinely check for engine fuel leaks and use a drip pan under engines	Boat storage area - recommended	MODERATE	MODERATE	LOW	LOW	Unattended boats with slow leaks can contaminate groundwater.
Avoid pumping any bilge water that is oily or has a visible sheen. Promote the use of materials that either capture or digest oil in bilges. Examine these materials frequently and replace as necessary	Boats with inboard engines	MODERATE to HIGH; can sell oil-absorbing materials to customers; require that customers use oil-absorbing/ digesting materials in their bilges at all times while in marina	MODERATE to HIGH; an economical and effective approach to preventing release of oil in bilge water into surface waters	LOW	LOW	Prior to turning on the bilge pump, inspect the bilge to ensure that no oil or fuel is in the bilge water; have replacement pads for sale at the marina.
Recycle used absorption pads if possible, or dispose of them in accordance with petroleum disposal guidelines	Marina	MODERATE; recycling and reusing (where possible) makes good economic sense	MODERATE to HIGH; recycling and reusing reduces raw material use	LOW	LOW	If recycling is not an option, boat owners should dispose of used pads in a sealed plastic bag for landfill disposal.
SOURCE REDUCTION PRACTICES						
Prohibit the use of detergents and emulsifiers on fuel spills	Marina basin - universally recommended	MODERATE; using detergents is illegal and can be fined by the U.S. Coast Guard	HIGH; soaps, detergents, and emulsifiers cause petroleum products to sink into water and make it impossible to remove	None	None	Many bilge cleaners are actually detergents; since better alternatives exist, use of detergent bilge cleaners should be discouraged.